VITRIFICATION OF AIRBORNE RADAR AND RADIOMETER MEASUREMENTS OBTAINED IN TOGA COARE

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The NASA/JPL Airborne Rain Mapping Radar (AR MAR) onboard the NASA DC-8 aircraft, several airborne multi-channel radiometers onboard the NASA ER-2 aircraft, and the doppler radars onboard the NOAA P-3 aircraft were deployed for rainfall observations collected over the Western Pacific Ocean during the TOGA/COARE experiment in January and February of 1993. Several coordinated flights in which near-simultaneous observation of the same rain system by these instruments were conducted during this period. The rain systems observed included isolated convective cells, mesoscale convective complexes, and a tropical cyclone. In this paper, we present the results on the cross-validation of' the radar and radiometric measurements of several of these airborne instruments. Using the brightness temperature measurements of three di fferent radiometers collected independently at the proximity of the radar reflectivity measurements between UT 23:33 and 23:39 on February 20, 1993, we deduce the path-averaged rain reflectivity. Our results show that the range of path-averaged rain reflectivities deduced from the radiometer measurements all fall within the range of 29 dBZ and 39 dBZ, which arc. in good agreement with the instantaneous radar reflectivity measurements obtained by ARMAR.

The consistency between the brightness temperature-deduced pa[h-averaged rain reflectivities and the instantaneous ARMAR's radar reflectivity measurements is expected because the brightness temperature measurements of all three radiometers were collected at the same viewing geometry as ARMAR's molar measurements. The P-3 radar reflectivity measurements, which were collected at horizontal viewing of the rain ccl 1, are expected to be lower due to non-spherical raindrop shape, radar polarization difference, and lai ger path-induced attenuation (longer rain path).